

Analysis Of Foundation Fieldbus Supply Impedance.
 By Analog Services, Inc.
 February 8, 2000
 Uses MathCAD 7

Finds Output Voltage Magnitude For Foundation Fieldbus Power Supply Impedance Test.
 Enter small values to represent 0 and large values to represent infinity or open circuit.
 Note: Cable capacitance is not part of test setup.

Set Up Frequency Steps:

$$N := 10 \cdot \log\left(\frac{1000000}{1}\right) \quad i := 0..N \quad k := 10^{\frac{1}{20}} \quad f_i := 10 \cdot k^i \quad s := \overrightarrow{(2 \pi \cdot f_i \cdot \sqrt{-1})}$$

Generate a terminator Impedance:

$$C_{\text{term}} := 10^{-6} \quad R_{\text{term}} := 100 \quad Z_{\text{term}} := \overrightarrow{R_{\text{term}} + \frac{1}{s \cdot C_{\text{term}}}}$$

Enter Inductor Characteristics: L value, Self Capacitance, and Core Loss Resistance.

$$L := 100 \cdot 10^{-3} \quad C_L := 1 \cdot 10^{-12} \quad R_L := 250 \quad Z_L := \overrightarrow{\frac{1}{\frac{1}{s \cdot L} + (s \cdot C_L) + \frac{1}{R_L}}}$$

Enter Resistance In Series With Inductor: $R_s := 0.1$

Enter Number of Terminators (1 or 2): $NT := 2$

Enter Cable Capacitance: $C_c := 1 \cdot 10^{-12}$

Calculate Impedance of Supply: $Z_s := \overrightarrow{Z_L + R_s}$

Calculate Vout:

$$Z := \frac{1}{\frac{NT}{Z_{\text{term}}} + \frac{1}{Z_s} + s \cdot C_c} \quad V_{\text{out}_i} := \left(10 \cdot \left| \frac{Z}{Z + 950} \right| \right)$$



